
Can Half-Day Trainings Motivate Small Contractors to Address Lead Safety?

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There is a real need to educate small painting and remodeling contractors about lead-safe work practices to protect the health of occupants (especially small children) and employees. From 1996 to 2000, 34 half-day lead awareness trainings were held throughout California to increase contractors' use of lead-safe practices. Educational methods included focusing on best practices, utilizing a peer educator, and working with stakeholders to do outreach to this hard-to-reach audience. We report on the evaluation of 18 of these seminars where we found that 30% to 49% of the interviewed contractors began doing many of the lead-safe work practices after attendance. We conclude that this program can have a modest impact in areas that contractors are more familiar with; new areas not part of their experience do not fare as well. However, without a more integrated public health educational and enforcement strategy, educational efforts such as ours can have only a limited impact.

Keywords: occupational health; small business; lead poisoning; lead-safe best practices; peer educator; intervention

From January 1996 to November 2000, we conducted 34 half-day lead safety awareness training seminars throughout California for small painting and remodeling contractors. Of the 1,462 participants attending the trainings conducted by the Occupational Lead Poisoning Prevention Program (OLPPP), Occupational Health Branch, California Department of Health Services (CDHS), 1,138 were contractors. This effort was supported by a workers' compensation insurance carrier, contractor organizations, and local health

departments. We report on our program's experience with outreach and training for these small business owners and the evaluation of these efforts. After completion of 22 seminars, an impact evaluation was conducted through a telephone survey of contractors who attended one of 18 seminars from October 1996 to May 1998.

The OLPPP in the CDHS is mandated to provide education to employers and workers about preventing work-related lead poisoning. The program's experience shows that employers are often unaware of lead hazards, techniques for controlling exposure, and Cal/Occupational Safety and Health Administration (OSHA) regulations to protect lead-exposed employees. Small business owners, in particular, lack resources

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and technical staff dedicated to employee health and safety.

► BACKGROUND

In 1992, Congress passed *Title X, The Residential Lead-Based Paint Hazard Reduction Act of 1992*, with regulatory phase-ins that directed the U.S. Environmental Protection Agency (EPA) to protect children, other building occupants, and workers from lead hazards. Title X recognized that childhood lead poisoning was a major environmental health problem and that construction workers continued to be lead poisoned on the job. As required by Title X, OSHA adopted, in 1993, a construction lead standard (OSHA, 1993) to protect workers.

Surface preparation work by painters puts workers at risk and can also contaminate the building and surrounding property if not done properly. There are case reports and population studies documenting elevated blood lead levels in children attributable to renovation and remodeling work (Amitai, Brown, Graef, & Cosgrove, 1991; Amitai et al., 1987; Environmental Protection Agency [EPA], 1999; Franko, Stasiuk, & Svenson, 1997; Marino et al., 1990; Rabinowitz, Leviton, & Bellinger, 1985). Paint removal using common methods has been shown to cause significant amounts of lead to scatter and settle over a widespread area, and cleanup was found often to be inadequate for reducing contamination to safe levels (EPA, 1997; National Institute for Occupational Safety and Health [NIOSH], 2001; Sussell, Gittleman, & Singal, 1999).

In addition, lead dust brought home by painters on their clothes, shoes, or bodies may endanger household members, especially young children. Studies have documented higher blood lead levels (BLLs) among children of construction workers as compared to neighborhood controls, as well as lead contamination in the automobiles and homes of construction workers (Piacitelli, Whelan, Sieber, & Gerwel, 1997; Whelan et al., 1997).

Lead adversely affects several body systems including the nervous, renal, and reproductive systems. Routes of exposure for inorganic lead (as found in lead paint) are inhalation and ingestion. Research shows multiple health effects at lead levels formerly believed safe.

A developing fetus and children up to the age of 6 years are especially sensitive to irreversible neurological damage from lead exposure. Available evidence suggests there is no BLL without risk of health effects in these populations (National Research Council, 1993). In addition, recent research demonstrated deficits in cognitive and academic skills associated with lead exposure at BLLs lower than 5 µg/dL among children aged 6 to 16 years (Lanphear, Dietrich, Auinger, & Cox, 2000).

In adults, several studies have associated lead exposure with elevations in blood pressure (Harlan, 1988;

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Hu et al., 1996; J. Schwartz, 1988); because hypertension is a significant risk factor for heart disease, lead exposure may exert an important influence on cardiovascular mortality. Neuropsychological studies performed in workers have detected subtle adverse effects on cognitive abilities, manual dexterity, muscle strength, reaction time, visual-motor coordination, and mood (Baker et al., 1985; Campara et al., 1984; Mantere, Hänninen, Hernberg, & Luukkonen, 1984; B. S. Schwartz et al., 2001; Stollery, 1996). Lead has been associated with adverse reproductive effects in men and women including abnormal sperm morphology or decreased sperm count (Alexander et al., 1996; Lerda, 1992; Telisman et al., 2000) and increased risk of spontaneous abortion (Bjora-Aburto et al., 1999).

In 1995, OLPPP determined that painting contractors and general and remodeling contractors were largely still unaware of Cal/OSHA's construction lead standard (Title 8 CCR 1532.1), which became effective in November 1993. Despite these regulatory actions, OLPPP found that contractors were not in compliance with nor educated in these areas. In general, these small business owners did not have lead safety programs to protect their employees, employees' families, and building occupants from lead poisoning because of the disturbance of lead paint during construction work.

Although they tend to be small (2 to 20 employees), there are thousands of painting and remodeling contractors across the state (16,000 licensed painting contractors in California alone; Contractors State Licensing

Board, 1999); thus, the total worker population is quite large. Given the large older housing stock in California (U.S. Bureau of the Census, 1992), there are many opportunities for occupants and workers to be exposed to lead paint (EPA, 1999).

After working with San Francisco-based painting contractors and their employees in a 2-year intervention research project (Materna et al., 2002), OLPPP identified increasing lead safety awareness among painting and remodeling contractors statewide as a high priority for the program. The intervention project titled the "California Painters Project" developed a number of industry-specific educational materials, best practices, and messages that were then revised for statewide distribution through this broader effort.

Population

Small contractors are an especially difficult audience to reach with a safety message, and yet there are thousands of them across the United States who, on a daily basis, direct thousands of employees in their work. Most construction companies are small, and the way in which health and safety practices are conducted in small companies may be substantially different than in larger ones (Eakin & MacEachen, 1998). The characteristics and barriers in this industry that make it difficult to implement successful prevention and training programs that reach, educate, and motivate small contractors has been described (Ringen & Stafford, 1996; Wolford, 1996). Akbar-Khanzadeh and Brossia (2000) found that the percentage of insured small businesses requesting government-provided health and safety services, and the number of hours spent providing such services, is lower when compared to requests from larger businesses. At the same time, the training of supervisors has been identified as being just as important as training workers because supervisors provide one of the most significant enabling or reinforcing factors on the job site (Ringen & Stafford, 1996). Therefore, for all these reasons we anticipated that recruiting small contractors to a government-sponsored educational program would require a significant effort.

► INTERVENTION

Outreach Strategies

OLPPP obtained support and endorsements from stakeholder organizations for the educational project. Some of these organizations participated in a program planning process where they contributed to the development of the curriculum and outreach strategies. We worked most closely with, and had as a cosponsor of many of these events, the State Compensation Insurance Fund, the state workers' compensation insurance carrier. Others who contributed to the outreach efforts and sometimes were part of the training program

included local organizations of small painting and general contractors, including the Painting and Decorating Contractors of America, County Builders' Exchanges, the Southern California Builders Association, and the National Association of Remodeling Industries; the International Union of Painters and Allied Trades; Cal/OSHA Consultation Service; and local health department childhood lead programs.

Our program's outreach strategy was to use a number of approaches simultaneously and to work with stakeholders to learn how they best reached their own constituents. Ironically, we discovered that contractor organizations themselves faced many of the same challenges in reaching contractors and that there was no one correct approach. At the same time, their endorsement of our training seminars lent a legitimacy to the program that only could help in recruiting contractors to attend.

Outreach and publicity methods used to recruit contractors to attend the seminars included targeted mailings using company addresses from a marketing database; notices in contractor organizations' newsletters, membership mailings, and Web sites; mailings to contractors insured by the State Compensation Insurance Fund; and outreach by county health departments.

The outreach message to contractors was encompassed in the training seminar title on the invitation flyer, "Prevent Lead Poisoning Before It Poisons Your Business!" The invitation emphasized that contractors would hear a fellow contractor discuss how to approach a job where lead could be present, get up-to-date information on lead requirements, begin to learn how to work safely around lead paint, and receive a contractor's guide to lead safety and other useful resources.

Educational Approach

Our educational approach drew on the theories of empowerment education (Freire, 1973), the diffusion and adoption of innovations (Rothman, 1974), and the health belief model (Rosenstock, 1974). Our training program content derived from a multistep causal analysis of the problem, which by design led us to promote a multifactorial set of interventions, some behavioral, some engineering controls, and some administrative (Goldenhar & Schulte, 1996; Vojtecky, 1988).

Empowerment education is an approach to learning that is participatory, based on the students' real-life experiences, incorporates dialogue between and among educators and students, seeks to give students the ability to identify and solve problems collectively, and critically analyzes the organizational and systemwide causes for problems. Although we had some limitations in participatory approaches because of the audience size (i.e., ranging from 11 to 108 attendees), we tried to maximize opportunities for dialogue and interaction. We also conveyed the message that lead poisoning was not an accident, nor due to one person's bad behavior, but much more dependent on what kind of hazard iden-

tification and prevention systems they instituted in their companies.

The diffusion and adoption approach is a process by which new ideas and practices are propagated and gain acceptance by groups of people. This educational approach was critical because we were attempting to introduce lead-safe work practices that were not part of what painting and remodeling contractors typically did. Given that attendees were voluntarily attending a government-sponsored educational activity, we believe that many of the contractor attendees represented, not the mainstream, but rather the more safety-motivated in their industry. They likely fell into the categories of being innovators, early adopters and early majority adopters, who were at various stages in the adoption process. This approach helped us to better understand our audience, identify areas of acceptance and resistance, and tailor our materials accordingly.

The health belief model maintains that individuals take action to avoid disease when motivated by certain factors. Here, we needed to convince small contractors that they were either in the past or present personally susceptible to lead poisoning (because many are working contractors), that their employees and families were personally susceptible (which was a threat to their business), and that the risk to both had a moderate degree of severity. We attempted to convince them that taking a particular set of lead-safe work actions would be beneficial to them and their employees by reducing their susceptibility to this disease. We encouraged contractors to convey this prevention message to their employees by alerting workers to dangerous work practices and conditions more frequently, expressing concern for worker safety explicitly, and praising workers for safe work, in a way that is culturally acceptable in this industry (Gillen, Baltz, Gassel, Kirsch, & Vaccaro, 2002).

Although this intervention was a training program, the content reflected a view that the participants had to undertake a combination of responsibilities and changes, and not just a change in knowledge, to create a lead safety program. For example, hazard identification and control, as a primary supervisory responsibility, has been identified as key to safety in the construction industry (McConnell, 1996). Contractors were told that they needed to (a) begin to use safer equipment such as HEPA-filtered vacuums (high efficiency particulate air) (engineering controls); (b) change certain high-risk work practices, such as uncontrolled power sanding on lead paint (behavioral change); and (c) ensure that their employees were properly trained to work in a lead-safe manner (administrative change). Within the four-level evaluation of training framework of reaction, learning, behavior, and results (Kirkpatrick, 1994), this effort was targeted at the behavioral and results levels.

The training itself utilized a motivational approach that discussed, in plain language, the public health, regulatory, liability, and marketability aspects of lead-safe painting and remodeling work. We de-emphasized the regulatory and technical language, while emphasizing

why lead safety was good for their business and something they could adopt and manage. We discussed a prioritization scheme for implementing a lead safety program, that is, taking a stepwise, staggered-over-time approach toward making their business lead-safe. We encouraged contractors to adopt the 3C's of best work practices—to contain, control, and clean up lead paint hazards to protect themselves, their employees, their employees' families, and the building occupants. Additional responsibilities under the OSHA construction lead standard were also covered.

A painting contractor served as a peer educator to share his experience with implementing a lead safety program. He emphasized that the average small business owner can protect his or her workers and the public from lead hazards and still run a profitable business. In fact, he described how his business and services had grown because he had built a professional reputation as a lead-safe painting contractor. He played a crucial role in establishing the credibility and "do-ability" of lead-safe contracting. The ability to convince the audience of the feasibility (best practices and economic viability) of lead-safe contracting, and to motivate them to adopt new safer practices, would have been substantially compromised without the participation of a peer contractor. If only program staff had conducted the training, we would have had a much more negative response from the audience, and the critical motivational message would have been lost.

Contractors received handouts, a contractor's lead safety manual; employee tailgate training materials in English, Spanish, and Chinese; an English/Spanish bilingual lead safety video; and a contractor liability video. They also received information and sample materials on the U.S. Environmental Protection Agency 406(b) lead notification rule, which requires that painting and remodeling contractors, prior to commencing work, notify homeowners and tenants of pre-1978 houses and apartments about the hazards of lead-based paint.

Ultimately, we conducted 34 half-day lead safety awareness training seminars throughout California for small painting and remodeling contractors, which were attended by 1,462 participants including 1,138 contractors.

► EVALUATION

Formative Evaluation

Seminar attendees provided immediate feedback to project staff and outside trainers through a written evaluation form and oral discussion at the end of each seminar. OLPPP staff, the outside trainers, and some stakeholders continued to meet periodically to assess the seminars and revise the content and approach.

Written evaluations from 10 of the earlier seminars found that 87% of contractor attendees said the infor-

mation was “very helpful,” 13% said it was “somewhat helpful,” and none said it was “not so helpful.”

Initial Impact Evaluation

Because the goal of the seminars was to prevent lead exposure to workers and building occupants through changes contractors implement after receiving the information about lead safety, the earlier-mentioned seminar evaluation form asked them a question regarding their intentions: “What lead safety changes do you think you will make in your business?” Many contractors responded with concrete actions they intended to take, including the following:

- “Begin to develop policies, procedures, and safer work practices company-wide.”
- “Adopt entire safety program and use as a marketing approach.”
- “All the necessary changes to ensure safety of employees and customers.”
- “Will definitely get employees aware of the health hazards of lead in buildings and housing.”
- “Test for lead before starting a job where sanding is necessary.”
- “Get one crew certified for any lead-based [paint] job we may do.”
- “Use respirators, not cotton masks.”
- “Start a medical surveillance program.”
- “Get HEPA vacuums and power tools.” [to clean up contamination/reduce dust generation]
- “Improve on housekeeping techniques to contain lead contamination.”
- “Educate customers on the importance of lead safety and hazards in their homes.”
- “We will make it a priority to learn *more* about lead safety.”

Impact Evaluation

After completion of the first 22 seminars, an impact evaluation was conducted in the fall of 1998 through a telephone survey of contractors who attended one of 18 seminars from October 1996 to May 1998. (Contractors attending the four seminars before October 1996 were excluded due to recall concerns.)

The telephone survey consisted of the following steps:

1. A list of contractors attending 18 seminars between October 1996 and May 1998 was generated from a database of all attendees by selecting only those individuals that identified themselves as a contractor. The total number of contractor attendees during this time period was 533 individuals.
2. The target number of interviews from each seminar was calculated. The goal of the survey was to obtain 100 completed interviews from the 533 contractor

TABLE 1
Interview Sample Selection Table

<i>Location</i>	<i>Target</i>
Number	
Pomona/Los Angeles	5
Woodland Hills/Los Angeles	8
Sacramento	5
Burlingame	17
Rohnert Park	8
San Francisco	7
Monterey	4
Redding	1
Chico	3
San Jose	7
Oxnard	7
Santa Ana	9
San Diego	3
Fresno	1
Bakersfield	2
Emeryville	10
Ukiah	1
Eureka	2
Total	100

attendees. To ensure that the survey included contractors from each of the 18 seminars, a proportional-to-size sampling strategy was used.

The following equation was used to calculate the number of interviews from each seminar.

$$\text{Target number} = n_i / 533 \times 100$$

n_i = number of contractors at a given seminar.

By sampling one or more contractors from each of the seminars, we hoped to obtain results that reflected the regional diversity of our target audience (see Table 1).

3. A contact list for each seminar was generated. The contact list included the name, company, address, and telephone number of every contractor attendee. Contractor attendees were contacted by phone, and the survey was administered.
4. OLPPP staff called through each contact list until the target number of interviews for each seminar was completed or the list was exhausted.

We collected 85 valid telephone interviews. The findings appear in Table 2.

► DISCUSSION

We were limited in our evaluation design by not having a baseline of information on these contractors prior to their attending the training nor having a comparison group. This reflects the reality that these hard-to-reach contractors are not going to provide us information on

TABLE 2
Telephone Survey Results (Valid N = 85)

<i>Number</i>	<i>Question</i>	<i>Response</i>	<i>Number</i>	<i>%^a</i>
5.	Type of contractor	Painting	44	51
		Remodeling/general	41	49
6.	Most important reason for attending	Learn how to work safely around lead paint	40	51
		Get information about lead regulations	20	26
		Learn about liability on lead jobs	11	14
		Find out about state certification	7	9
7.	Does company do lead jobs?	Yes	77	97
		No	2	3
8.	Took supervisor certification course	Yes	19	23
		No	65	77
9.	Got state supervisor certification	Yes	13	16
		No	70	84
10.	Tested for lead before jobs	Already doing this	24	29
		Started after seminar	25	30
		Not doing it (no testing)	34	41
11.	Provided half-mask P-100 respirators	Already doing this	30	36
		Started after seminar	32	39
		Not doing it	21	25
12.	Used plastic sheeting to contain chips	Already doing this	34	41
		Started after seminar	38	45
		Not doing it	12	14
13.	Cleaned with HEPA vacuum or wet methods	Already doing this	21	26
		Started after seminar	33	41
		Not doing it	27	33
14.	Used safer, less dusty work methods	Already doing this	12	15
		Started after seminar	41	49
		Not doing it	30	36
15.	Did blood lead testing	Already doing this	11	13
		Started after seminar	14	17
		Not doing it	58	70
17.	Would like additional information	Yes	67	82
		No	15	18

NOTE: HEPA = high efficiency particulate air.

a. Reflects percentage of respondents answering question (not all respondents answered every question).

Question 16 responses were omitted because it was an open-ended question regarding any other steps to improve lead safety contractors had taken since attending the seminar. Responses were varied and numerous.

their company practices prior to attendance for fear of repercussions. As with any type of voluntary walk-in program, comprehensive evaluations of such efforts are limited. Evaluators Rossi and Freeman (1985) acknowledged that truly comprehensive evaluations are often impractical (and expensive), and they encourage evaluators to carefully identify the critical questions to be answered to meet a “good enough” criterion for determining program success. Despite the limitations of a posttest only, noncomparison group evaluation design, the survey suggests that attendees took some steps to improve lead safety.

We asked about making changes after attending the seminar, including testing paint for lead; using containment; using safer, less dusty, work methods; cleaning up with HEPA vacuums or wet methods; providing half-mask P-100 (HEPA) respirators; and providing blood lead testing. In nearly all these areas, 30% to 49% of surveyed contractors began doing the recommended work practice after attending the seminar. In contrast, only 17% of surveyed contractors did blood lead testing after attending. In addition, 23% of the contractors said someone from their company had sought additional training by attending a 5-day supervisor course in lead-

related construction, and 16% said a representative became state certified in lead-related construction as a supervisor.

Barriers/Challenges Encountered

Some of the barriers/challenges we encountered included the following areas. We grappled with the OSHA and EPA regulations being complex and written as though “one size fits all,” whereas these small businesses, even if motivated, do not have the compliance capabilities of larger firms. Therefore, we made the training content very practical, with more of a best practices approach, rather than with a regulatory tone, to increase the likelihood of implementation. Typical for a short program, there was tension between covering content versus using more participatory activities where greater learning is achieved. Recruiting small contractors to attend training is difficult, so it was important to find incentives to attract the interested/motivated ones. With this particular audience we were able to utilize the issue of customer family health concerns as a recruitment lever and motivational message. However, even motivated contractors have concerns that if they include the costs of compliance in their bids when other contractors do not, this could result in a loss of business. Clearly, not competing on a “level playing field” with other contractors is a threshold issue for deciding if they are going to participate in this change process. In addition, some small contractors have high employee turnover, so they are hesitant to invest in an employee safety and training program.

► CONCLUSION

OLPPP’s observations indicate that this project is one of the program’s most successful statewide outreach and educational activities. Of a total of 1,000 individuals, 779 contractors participated in the first 22 half-day events, and a grand total of 1,138 contractors of 1,462 participated in all 34 seminars.

The seminars have been well attended by contractors, most of whom rated them highly and indicated that they intended to take steps to increase protections for their employees, their employees’ families, and the occupants of the buildings they work on. The participating trade associations and local agencies have been extremely supportive and have substantially increased their involvement in lead paint/contractor issues. OLPPP staff has gained invaluable experience in reaching small business owners with a health and safety message.

Some key factors that have made this a successful effort include the following:

- developing a best practices message that is as clear as possible (protecting workers, their families, and building occupants by applying the 3C’s: contain, control, clean up)

- minimizing use of regulatory and technical language
- presenting a stepwise implementation approach (e.g., what can be done in the short term vs. long term)
- utilizing a painting or remodeling contractor as a peer educator/trainer to talk about the do-ability issues and concerns, dealing with the customer, the pitfalls, the successes, and how lead safety has affected his or her business
- emphasizing the business context/framework (why it is good for your business and it is the right thing to do)
- involving stakeholders and building relationships with them so they will help sell the program

We found that a half-day lead safety awareness program, although limited in scope, can have a modest impact, especially in areas that contractors are more familiar with, for example, running a construction job while integrating lead-safe work practices. However, new areas not part of their experience do not fare as well, for example, providing blood lead testing to employees.

After attending our seminars, some contractors chose to avoid jobs where lead paint is disturbed, others chose to implement a modified program, whereas others took further training and became state certified. Our interviews suggest that for these two latter groups it is important to have an ongoing effort to provide additional assistance and support, to sustain the changes made, and to enhance the possibility of having a broader impact on the culture of the industry.

► IMPLICATIONS

Half-day trainings can make contractors aware of lead hazards and motivate them to begin to do more, however, they are not comprehensive enough to teach contractors to implement a complete lead safety program. Even the most comprehensive training is only one of a multitude of factors that affect whether these contractors change the way they operate their businesses. Other factors outside of the realm of OLPPP’s efforts include whether there is customer demand for lead-safe work, whether there is governmental and public recognition of the value of lead-safe contractors, whether there is concern regarding liability, whether there is consistent and comprehensive regulatory enforcement, and whether the increased costs are being lowered as equipment and materials are more available and practices are more widely accepted. These factors need to come into greater play to create the social, political, and economic environment for changing and supporting the way contractors address lead safety.

However, even the most motivated (the early adopters) are not likely to continue along the change process or sustain it if there are not realizable economic rewards and social incentives as those listed earlier. Without these factors coming into play, the likelihood of motivating the middle, less motivated audience of contractors to adopt lead-safe practices becomes even more remote. Motivated contractors call this “leveling the

playing field”; what they mean is that they are willing to participate in an industry-wide cultural change if they witness that the program, the pressures, and the disincentives are applied uniformly and that they are not put at an economic disadvantage in relation to their competitors.

Our project, although focused on an educational intervention effort, also created a forum that brought to light shortcomings in the public health and regulatory enforcement strategies for protecting workers and building occupants. Our interaction with contractors identified at times a lack of integration between various guidelines, regulations, and training requirements pertaining to lead poisoning prevention. Developing separate, and sometimes contradictory, regulations for worker, childhood, and environmental protections creates huge disincentives for contractors to be participants in this change process. The issue of lead poisoning prevention presents a unique opportunity to address a problem in an integrated public health approach or to have it spiral out into fragmented approaches that are piecemeal at best and ineffective at worst.

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